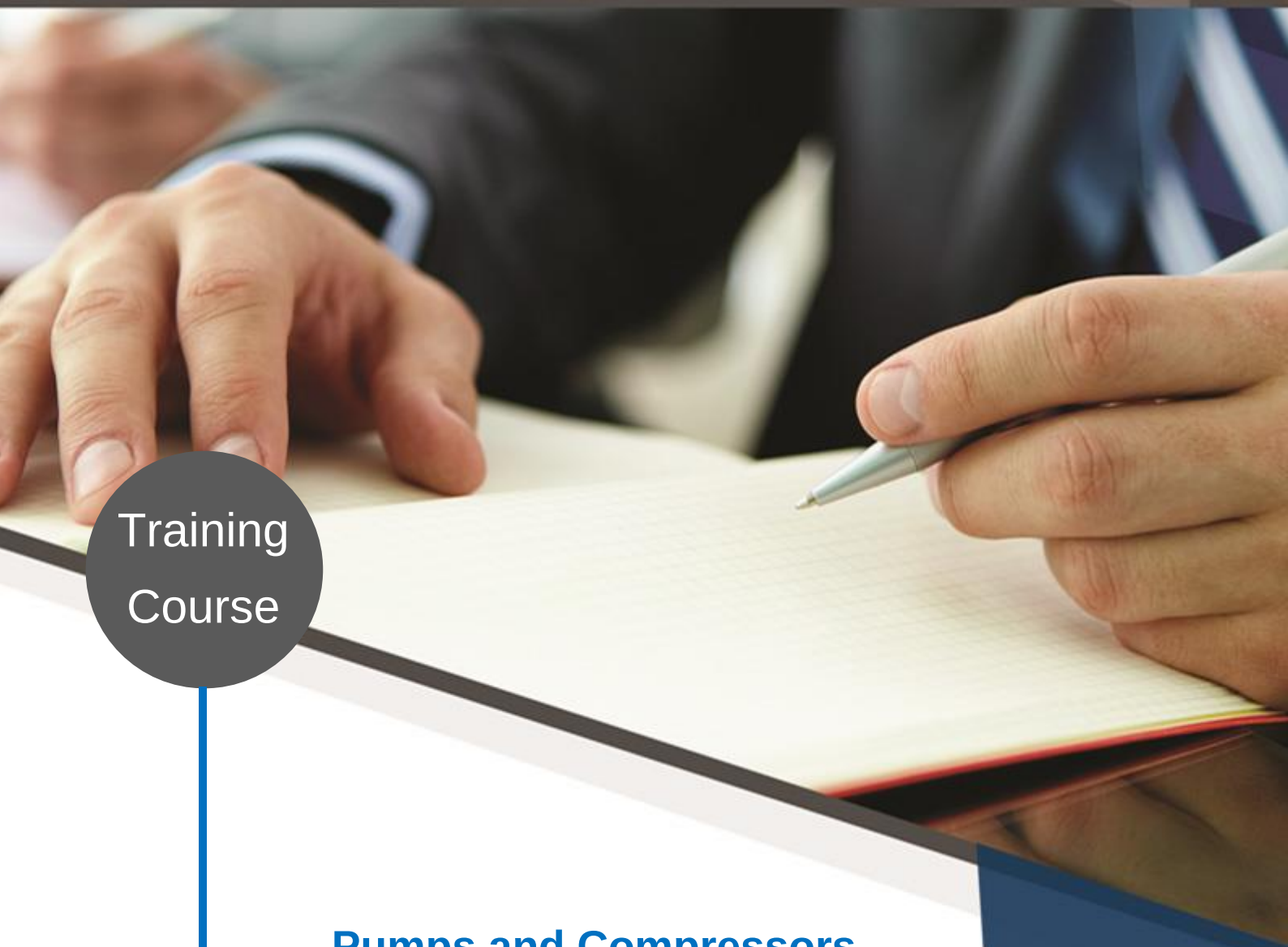
Skills International for Training & Consulting



Training Course

Pumps and Compressors Operation, Maintenance, and Troubleshooting

Skills International for Training & Consulting

سكلز الدولية للتدريب والإستشارات

Course Plan

Introduction

This course covers the construction, design, operations, and maintenance of compressors and rotary/ centrifugal/ reciprocating pumps

Course Objectives:

- ✓ Describe the operation of centrifugal and positive displacement pumps including pump design aspects, laws, performance comparisons, characteristic curves, and performance testing
- ✓ Test rotary pump performance and apply maintenance and troubleshooting techniques
- ✓ Identify reciprocating pump types and maintenance
- ✓ Identify compressor types and how they operate To apply the various methods of pump alignments

Who Should Attend?

- ❖ Individuals who are working in the pipeline industry, such as pipeline engineers, pipeline operators and technicians, pipeline maintenance personnel, pipeline safety professionals, pipeline construction contractors, and the emergency response personnel.

- Different levels of technical expertise and can cover a range of topics, from basic pipeline operations to advanced troubleshooting and failure analysis.

Training Methods:

- ✓ Online Video material.
- ✓ Presentation.
- ✓ Live Interactive sessions.
- ✓ Course presenter will make extensive use of all tools that will be needed for the virtual environment.
- ✓ Questions & Answers

Course Outline:

Day One

Introduction to Pumps, Compressors, Operation and Maintenance Issues

- Welcome and Introduction
  - Course objectives and outline
  - Participant introductions.
- Introduction to Compressors and Pumps
  - Definition and Purpose
  - Overview
  - Key applications in various industries

- How compressors work: increasing gas pressure by reducing volume
- How pumps work: moving liquids by adding energy to the fluid
- Types of Compressors
- Types of Pumps
- Important parameters: flow rate, pressure, efficiency, power consumption
- Application Examples

- Operation of Compressors and Pumps
  - The need for steps to avoid damage during start-up and shutdowns
  - Importance of operating within specified parameters: Temperature, pressure, and fluid characteristics
  - Key performance metrics: Flow rate, pressure, efficiency, power consumption
  - Adjustments to maximize performance and minimize energy consumption
  - Ensuring safety during operations
  - Emergency procedures and handling unexpected issues
  - Managing emissions and leaks
  - Compliance with environmental regulations
- Common Maintenance Issues in Compressors and Pumps
  - Wear and tear of components (seals, bearings, impellers, rotors)
  - Lubrication problems leading to friction and overheating
  - Clogging and blockages in fluid pathways
  - Symptoms of Malfunction (Unusual noises and vibrations, Decreased performance and efficiency, Leakage of fluids or gases
  - Identifying and diagnosing issues

- Preventive Maintenance Strategies
- Using monitoring systems to detect early signs of problems
- Safey Considerations: Proper use of personal protective equipment
- Documentation and Record-Keeping

- Summary of key concepts covered
- Open floor for questions and discussion

Day Two

Construction, Design, Operations, and Maintenance of Centrifugal Pumps

- Brief introduction of the day's agenda
- Basic Principles of Operation: How centrifugal pumps work
- Key components:
  - Impeller
  - Casing
  - Shaft
  - Seals
  - Bearings
- Design Aspects
  - Types of impellers (open, semi-open, closed)
  - Types of casings (volute, diffuser)
  - Materials of construction and compatibility issues
- Performance Characteristics and Testing
  - Laws governing pump performance
  - Affinity laws and their applications
  - Performance metrics: flow rate, head, power, efficiency
  - Characteristic curves

- Reading and interpreting pump curves
- Head vs. flow rate, efficiency, power consumption, and NPSH (Net Positive Suction Head) curves
- Performance Testing
- Standard testing procedures
- Analyzing test results
- Performance comparisons with other types of pumps

- Construction
  - Detailed look at the assembly process
  - Importance of precise manufacturing and quality control
- Operations
  - Operational Considerations
  - Proper start-up and shutdown procedures
  - Operating conditions: temperature, pressure, and fluid characteristics
  - Common operational issues and troubleshooting

Day Three

Centrifugal Pumps: Maintenance and Troubleshooting

- Maintenance and Troubleshooting
  - Routine Maintenance Procedures
  - Scheduled inspections and servicing
  - Lubrication and cooling requirements
  - Common Failures and Troubleshooting
  - Identifying symptoms of pump failure
  - Diagnosing issues: cavitation, vibration, noise
  - Repair techniques and best practices

- Case study
- Summary of key concepts covered
- Exercises
- Open floor for questions and discussion

Construction, Design, Operations, and Maintenance of Reciprocating Pumps

- Brief introduction of the day's agenda
- Basic Principles
    - How reciprocating pumps work
    - Key components: piston, cylinder, valves, crankshaft
    - Performance comparisons with other types of pumps
- Types of Reciprocating Pumps
    - Single-acting vs. double-acting
    - Diaphragm pumps
    - Plunger pumps
- Maintenance and Troubleshooting
    - Scheduled inspections and servicing
    - Lubrication and cooling requirements
    - Identifying symptoms of pump failure
    - Diagnosing issues: wear, cavitation, and noise
    - Repair techniques and best practices
- Case studies
- Summary of key concepts covered
- Exercises
- Open floor for questions and discussion

Day Four

Construction, Design, Operations, and Maintenance of Rotary Pumps

- Brief introduction of the day's agenda
- Basic Principles
    - How rotary pumps work
    - Key components: rotors, casing, and seals
    - Types of Rotary Pumps: Gear, Vane, Screw and Lobe pumps
- Performance Characteristics and Testing
    - Performance Metrics: Flow rate, pressure, and efficiency
    - Reading and interpreting performance curves
    - Head vs. flow rate, efficiency, power consumption
    - Analyzing test results and troubleshooting performance issues
    - Performance comparisons with other types of pumps
- Maintenance and Troubleshooting
    - Scheduled inspections and servicing
    - Lubrication and cooling requirements
    - Identifying common symptoms of pump failure
    - Diagnosing issues: wear, cavitation, and noise
    - Repair techniques and best practices
- Summary of key concepts covered
- Exercises
- Open floor for questions and discussion

Pump Alignment

- Importance of Pump Alignment
    - Types of Pump Misalignment: Angular, Parallel, and Radial Misalignments

- Methods of Pump Alignment
    - Visual Alignment
    - Dial Indicator Method
    - Laser Alignment
    - Plumb Bob Method
- Alignment Tools and Equipment
    - Overview of alignment tools (dial indicators, laser alignment systems, straightedges)
    - Proper usage and calibration of tools
- Common Alignment Issues
    - Identifying signs of misalignment (vibration, noise, excessive wear)
    - Troubleshooting common alignment problems
    - Regular monitoring and re-alignment as part of maintenance
- Summary of key concepts covered
- Exercises
- Open floor for questions and discussion

Day Five

Construction, Design, Operations, and Maintenance of Compressors

- Brief introduction of the day's agenda
- Basic Principles
    - How compressors work
    - Key components: compression chamber, valves, rotors, pistons
- Types of Compressors
    - Reciprocating compressors
    - Rotary compressors (screw, vane, lobe)

- Centrifugal compressors
- Design Aspects
  - Differences in design among types
  - Materials of construction and application suitability
- Performance Characteristics and Testing
  - Flow rate, pressure, efficiency, power consumption
  - Reading and interpreting performance curves
  - Pressure vs. flow rate, efficiency, power consumption
  - Standard testing procedures
  - Analyzing test results and troubleshooting performance issues
- Construction
  - Detailed look at the assembly process
- Operational Considerations
  - Proper start-up and shutdown procedures
  - Operating conditions: temperature, pressure, and fluid characteristics
- Case studies
- Summary of key concepts covered
- Exercises
- Open floor for questions and discussion

Training Details

Course Duration	5 Days
Pre-Schedule	17 – 21 November 2024
Venue	Dubai – Tower Plaza Hotel
Training Fees Per Person	KWD 1200 (One Thousand Two Hundred Only)
Course Fees Include	✓ Tuition documentation ✓ Curriculum and Training Handout ✓ Five star Lunch ✓ Completion Certificates